



Energy Storage Solutions

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Energy Storage
GE Power

October 22, 2018

Unlocking Value Across the
Electricity Network

Leapfrogging Technology Transforms Ecosystems

NYC 1900



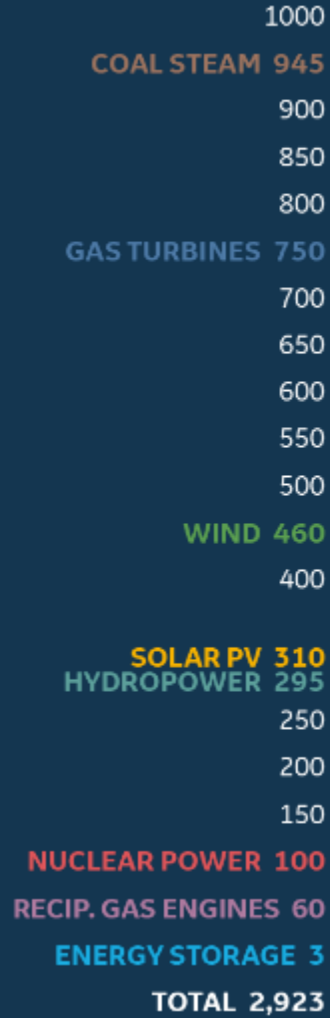
NYC 1913



Difficult to predict the pace of change

A Lot Can Happen In 10 Years

TOTAL CAPACITY ORDERS (GW)
2007-2016



TOTAL CAPACITY ORDERS (GW)
2017-2026



Source: GE

Trends Disrupting the Power Sector from Generation to T&D



DECARBONIZATION

78% OF THE 9000GW+ OF NEW
GENERATION FORECAST TO BE BUILT BY 2040
WILL BE RENEWABLE

IMPACT

- Generation is becoming difficult to forecast & variable
- Grid stability, congestion volatility on electricity markets



DIGITIZATION

TOTAL SOFTWARE
REVENUE TO HIT \$3.3ENERGY STORAGE BILLION BY 2025

IMPACT

- Allowing decision making based on dynamic and nodal prices



DECENTRALIZATION

ANNUAL INSTALLED CAPACITY OF
DISTRIBUTED ENERGY RESOURCES
IS EXPECTED TO REACH 530 GW BY 2026

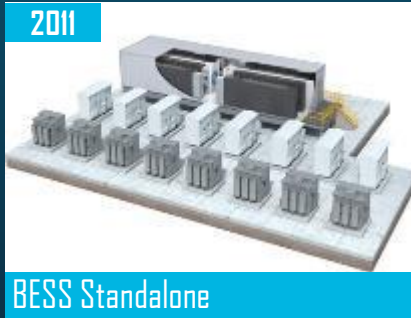
IMPACT

- End user becomes an active actor of the power system ('prosumer')
- Growing complexity of distribution grids



The evolution of Grid Scale Energy Storage at GE

System Integration Level



- Low load factor-2/3 services
- Sub-components modularity
- Sustained by one-off feed-in events



- Topped up usage stack
- First automated black-start
- Partial integration with Generation control



- Enhanced Generation
- Savings on LCDE & water
- Fully integrated system (HW & Control)

2018

Reservoir

- Design to install
- 2 blocks modularity
- AC and DC coupling & integration

- + Layers in the BESS value stack
- + Efficiency delivering grid stability
- + Optimization of existing assets
- + Shifting to better system efficiency

Design Complexity



Blackstart and Frequency Regulation

Grid restoration black start capability, Traditional power plant hybridized

Most Utilized Battery System in the World

- Modified Battery Storage hardware and controls after commissioning 33 MW, 20MWh facility
- Enable automatic transition to grid islanding, creating microgrid to start the gas turbine
- Providing emergency black start for Imperial Irrigation District, California, 44MW of CCGT power plant



Innovation of the year 2017

A GE gas turbine fleet to be hybridized

World's First Battery-Gas Turbine Hybrid

- Helps meet immediate energy needs in California
- Enhances flexibility, reliability and response time to customer's energy demands
- Allows more effective use of renewables and faster response to changing demands
- Reduces environmental impact and cost for Southern California Edison's operations and its customers



Break through in the UK

Partnership with Arenko for Grid Services

3rd Largest System in UK, only Fully Merchant

- Fully merchant system ... integrated energy trading software with energy storage controls
- Participate in UK ancillary services market ... 420ms activation time
- 41MW Customized design in pre-existing building

